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## Beta-atrophy in Alzheimer's disease

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**Sir,  
Beta-atrophy in Alzheimer's disease**

Q1



Several studies have shown optic nerve changes in Alzheimer's disease (AD).<sup>1–3</sup> Parapapillary atrophy is classified into two zones:<sup>4</sup> alpha- and beta-atrophy. Beta-atrophy is between the disc and the rim of alpha-atrophy, and appears as small grey fields on a whitish background. Beta-atrophy area measurement is said by Jonas to be more reproducible than the alpha-atrophy area, and is suggested as a preferred outcome.<sup>4</sup> Parapapillary atrophy has never been measured in AD until our prospective case-control study, the methods of which are described elsewhere.<sup>5</sup> The following two populations were sampled: AD patients for cases and cognitively intact individuals over 65 for comparators. Ethical committee approval was granted. Dilated stereoscopic optic disc photography was performed, and all gradings were performed by one masked investigator (MM). A hand-held stereoscope, touch-activated drawing pad, and 'DiscArea' software (University of Iowa, Iowa city, IA, USA) were used. Ungradable disc photographs were excluded. Each participant's right eye was assessed unless ungradable or unavailable; then, the left eye was used. Five per cent of images were selected using random number tables and reggraded by an experienced grader (GS). For beta-atrophy area, the intra-observer (kappa = 0.55) and inter-observer agreements were 'moderate' (kappa = 0.51). The mean age of all comparators ( $n = 322$ ) was 77 years (SD 6.8 years) and that of cases ( $n = 258$ ) 80 years (SD 7.7 years). Images were gradable in 193 cases and 274 comparators. In a univariate analysis, area of beta-atrophy was not associated with AD status ( $P = 0.4$ ). Potentially confounding variables were picked. There was a significant difference (Mann-Whitney  $U$ -test;  $P < 0.001$ ) between the ages of AD cases and comparators, and age was, therefore, included in all models. Smoking was associated with the AD status ( $\chi^2 = 4.4$ ,  $df = 1$ ,  $P = 0.04$ ), and the given reported association of smoking with primary open angle glaucoma, smoking status was included. A diagnosis of glaucoma had been made and/or topical ocular hypotensive agents were being used in 3.7% of comparators (12/322) and 6.2% of cases (16/258;  $\chi^2 = 1.9$ ,  $df = 1$ ,  $P = 0.17$ ). Systemic beta-blockers were used by 25.4% of comparators (75/295) and by 18.6% of AD cases (44/237;  $\chi^2 = 3.6$ ,  $df = 1$ ,  $P = 0.059$ ). Area of beta-atrophy (in pixels) was positively skewed: after log transformation to base 10, distribution was normal. Binary logistic regression with AD status (case or comparator) as the dependent variable and backward stepwise elimination led to a model in which age ( $P < 0.001$ , OR = 1.005, 95% CIs 1.0002–1.007) and use of systemic beta-blockers ( $P = 0.032$ , ORs = 1.7, 95% CIs 1.0–2.9) were associated with the AD status, but log<sub>10</sub> beta-atrophy area was not ( $P = 0.670$ , ORs = 1.000). As in

any clinical study on AD, 'cases' may have included some mixed or even vascular dementia cases; however, this study has a large sample size compared with previous studies on ophthalmic findings and AD. Analysis of ocular changes has potential value for the early detection of or monitoring of AD. Retinal photography does not rely on expensive or unwieldy equipment. The findings from our sample, however, suggest that beta-atrophy area would not be a useful measure in an AD test-battery.

**Conflict of interest**

The authors declare no conflict of interest.

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